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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,429	02/14/2008	Zhongxin Ge	1034136-000040	2919
21839 7590 05/13/2009 BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			EXAMINER RIDER, LANCE W	
			ART UNIT 4131	PAPER NUMBER
			NOTIFICATION DATE 05/13/2009	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/594,429	<b>Applicant(s)</b> GE ET AL.	
	<b>Examiner</b> LANCE RIDER	<b>Art Unit</b> 4131	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 June 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/26/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/26/2006, 4/09/2007</u> .                                    | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-8 are currently pending.

### ***Information Disclosure Statement***

The two Information Disclosure Statements (IDS)s, filed by applicant on September 26, 2006, and on April 09, 2007 have been considered by the examiner in the present case.

### ***Priority***

This application, filed February 14, 2008 is a national stage entry of PCT/US05/10220 filed March 25, 2005 which claims priority from provisional application 60/556431 filed March 26, 2004. Claims 1-8 are currently supported in the specification of provisional application 60/55643.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 4131

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dorn et al., U.S. Patent 6,303,760 in view of Hinokuma et al., U.S. Patent 6,495,290.

Claims 1 and 4 are drawn to polyhydroxy hydrogensulfated trimetallic nitride endohedral metallofullerenes comprising a plurality of hydroxyl groups and a plurality of hydrogensulfate groups covalently bonded to fullerenes encapsulating a trimetallic nitride. Dorn et al., U.S. Patent 6,303,760 discloses in columns 1 and 2, summary of the invention, paragraphs 7-12, a number of trimetallic nitride endohedral metallofullerenes and methods for their production. Dorn also discloses metallofullerenes of the formula  $A_{3-n}X_nN@C_m$ .

Dorn et al. does not disclose a method for coating said fullerene with hydroxyl or hydrogensulfate groups.

Hinokuma et al., U.S. Patent 6,495,290 discloses a method for polyhydroxylating and adding hydrogen sulfate groups to fullerenes. Though Hinokuma et al. does not disclose a trimetallic nitride endohedral metallofullerene, the alteration of the surface chemistry of a fullerene is clearly disclosed. The lack of the water solubility of uncoated fullerenes was well known to those of ordinary skill in the art at the time of the invention. It would have been obvious to apply the procedure of the Hinokuma et al. patent to alter the surface chemistry of the trimetallic nitride endohedral metallofullerenes of the Dorn et al. patent to increase the solubility of the fullerenes.. Claims 1 and 4 would have been an obvious combination to make for one of ordinary skill in the art at the time of the invention.

Claims 2-3 and 5-6 are polyhydroxy hydrogensulfated trimetallic nitride endohedral metallofullerenes further limited by the trimetallic nitride present. Dorn et al., U.S. Patent 6,303,760 discloses in column 2, summary of the invention, line 18 that the metal can be a rare earth element from group IIIB. Dorn et al, further discloses these elements, in lines 21 and 22, to be Scandium, Yttrium, Lanthanum, Gadolinium, Holmium, Erbium, Thulium, and Ytterbium. The polyhydroxy hydrogensulfated trimetallic nitride endohedral metallofullerenes, further limited by the trimetallic nitride present, would have been an obvious combination to make for one of ordinary skill in the art at the time of the invention in light of the Dorn et al. patent, and for the reasons cited supra for claims 1 and 4.

Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dorn et al., U.S. Patent 6,303,760 in view of Hinokuma et al., U.S. Patent 6,495,290 and Tianbao, Li et al., *J. Cent. South Univ. Technol.*, 1999).

Claim 7 is drawn to a method of hydroxylation and hydrosulfation of a trimetallic nitride fullerene comprising the active steps of reaction the fullerene with NaOH and TBAH in **toluene**, contacting the reacted fullerene with water and hydrogen peroxide to produce the hydroxylated fullerene, and finally reacting the hydroxylated fullerene with sulfuric acid to add hydrogensulfate groups to the fullerene. (Tianbao, Li et al., *J. Cent. South Univ. Technol.*, 1999) discloses on page 35, experimental section, paragraph 2, the synthesis of a hydroxylated fullerene comprising the active steps of reacting the fullerene with NaOH and TBAH in **benzene**, and contacting the reacted fullerene with water and hydrogen peroxide to produce the hydroxylate fullerene. Both **toluene** and **benzene** are common hydrophobic solvents well known in the art and would be obvious to exchange for one another. This would have been common knowledge for one of ordinary skill in the art at the time of the invention. Hinokuma et al., U.S. Patent 6,495,290 discloses in column 18, lines 42-56, a method for adding hydrogen sulfate groups to hydroxylated fullerenes by reacting hydroxylated fullerenes, as formed in (Tianbao, Li et al., *J. Cent. South Univ. Technol.*, 1999), with sulfuric acid to form hydrogen-sulfated fullerenes. These are a combination of common organic synthetic steps used to modify the surface of fullerenes, and would have been obvious methods for making both hydroxylated and hydrogen-sulfated fullerenes for one of ordinary skill in the art at the time of the invention. The lack of the water solubility of uncoated

Art Unit: 4131

fullerenes was well known to those of ordinary skill in the art at the time of the invention. It would have been obvious to apply these known synthetic organic steps for altering the surfaces of fullerenes from the procedure of (Tianbao, Li et al., *J. Cent. South Univ. Technol.*, 1999), and the Hinokuma et al. patent to alter the surface chemistry of the trimetallic nitride endohedral metallofullerenes of the Dorn et al. patent to increase the solubility of the fullerenes.

Claim 8 is drawn to the polyhydroxy hydrogensulfated trimetallic nitride endohedral metallofullerene made using the process of claim seven. As the synthetic procedure claimed in claim 7 would have been obvious to one of ordinary skill in the art at the time of the invention, neither claim 8 or claim 7 provide further information that was not already disclosed by the prior art. Claim 8 would make the polyhydroxy hydrogensulfated trimetallic nitride endohedral metallofullerenes of claim 1 and 4 and is therefore unpatentable for the reasons cited supra for claims 1 and 4.

### ***Conclusion***

No claims are currently allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LANCE RIDER whose telephone number is (571)270-1337. The examiner can normally be reached on Monday through Friday, 7:30 to 5:00.

Art Unit: 4131

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Nolan can be reached on 571-272-0847. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LANCE RIDER/  
Examiner, Art Unit 4131

/Patrick J. Nolan/  
Supervisory Patent Examiner, Art Unit 4131